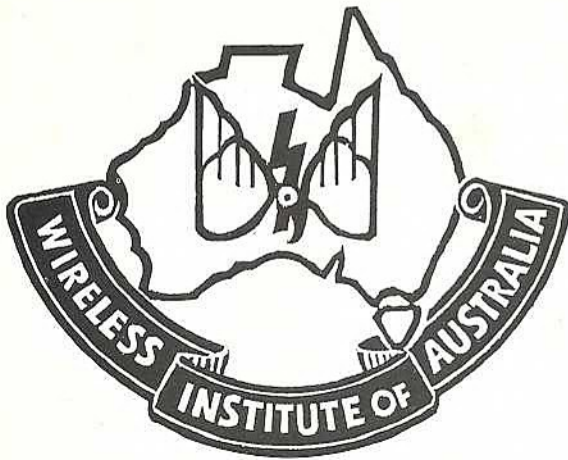
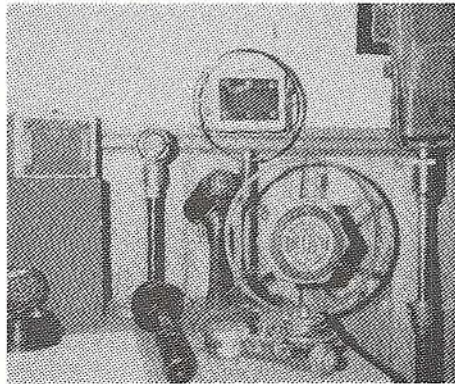


89/05 01 MAY 1989



B·A·R·G NEWS

MAY 1989.



© Monthly Newsletter of the
Ballarat Amateur Radio Group

89/05 02

BALLARAT AMATEUR RADIO GROUP INCORPORATED

OFFICERS 1988-1989

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			HOME	BUSINESS
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Vice President:	GORDON CORNELL	VK3 PUW	39 2427	39 1135
Secretary:	JIM WRIGHT	VK3 CFB	32 7563	
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Asst. Secretary:	GEORGE FOWLER	VK3 DOK	32 6863	39 1954
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Memb. Representative:	NEAL DAVIDSON	VK3 KQQ	35 9612	

OFFICERS AND COMMITTEES

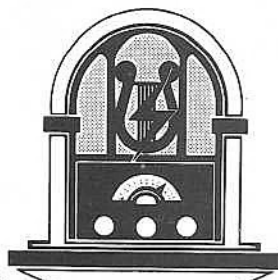
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	MAURIE BATT	VK3 XEX	42 2245	
	PHIL SEDDON	VK3 AQM	31 5220	
	MURRAY FELSTEAD	VK3 AAI	41 2234	

B.A.R.G. meets on the **LAST FRIDAY** in every month except December at the Ballarat Education Centre, Hopetoun St., Ballarat at 7.30 p.m.

Committee meetings are held at the Education Centre on the Wednesday two weeks prior to the Club meeting at 7.30 p.m. Executive committee members are expected to attend and any club member with business for discussion is welcome.

All correspondence to: The Secretary, BARG Inc., P.O. Box 216E, Ballarat East, 3350.

Applications for Awards to: Maurie Batt, RSD, Rokewood Junction, 3351.



ORPHEUS

RADIO MUSEUM

CNR. RING RD. & WESTERN HWY BALLARAT
(OPEN 10AM - 5 PM 7 DAYS A WEEK)

FEATURES

- GRAMOPHONES • VINTAGE RADIOS • VISITORS PARTICIPATION
- MEMORABILIA • AUDIO DISPLAYS • DEMONSTRATIONS • CRYSTAL SETS

The "Orpheus Radio Museum" is operated by Richard and Sonja Wilson.
The collection includes their private collection, the 3BA collection and other items on loan to the museum.

The museum is run with the idea of preserving the history of radio in Australia and making it accessible to the public.

If anyone has any information or items of interest to the museum, would they please contact, or write to, the "Orpheus Radio Museum" RSD B98, Ballarat 3352. Telephone (053) 34 2513.

Let the public enjoy your piece of Radio History.

89/05 03

MINUTES OF GENERAL MEETING HELD 28th APRIL.1989.

MEETING OPENED by Vice President Gordon VK3 KGC at 7.45pm with 23 Members in attendance, and one visitor Bill VK3 PAL.

APOLOGIES VK3 FIO, DKJ, BNC, NIZ, PUA, NIA, CUH, KIT.

MINUTES of previous meeting as circulated were confirmed. CAZ/KQF.

CORRESPONDENCE IN Notice of SERG Convention 10th & 11th June.

TREASURERS REPORT. General a/c \$765.58. VS&L a/c 2196.82. KGL/AXH.

QSL MANAGER Jejj PAP received 172 cards in .

AWARDS MANAGER. No applications received. Congratulations to Maury on winning the VHF/Uhf Contest.

CLUB NET Co-ordinator Fred KQF would like a few more participants.

EDUCATION Ian AXH reported that the classes are going well.

TECHNICAL Low Cycle Battery has been purchased for RBS and RPC is operational.

NEWSLETTER. Articles for publication urgently needed.

WICEN Gordon KGC will be attending the divisional meeting in May.

DIGITAL REPEATER. Moved by DMK seconded AAI that Club seek assistance of the AAPRA for the supply of TNC for Barg repeater at a cost of BARG of \$1.00. carried.

GENERAL BUSINESS Moved AXH seconded CAZ that secretary inform WIA that BARG would be interested in becoming an examining body when devolvment from DOTC takes place.
Question from Bill PAL re repeater on Ben Nevis.
It appears that when the necessary building is completed and equipment installed by the WIA, BARG will be asked to maintain it.

Fred KQQ asked about the 10/10 award and Geoff ADB is going to supply the necessary information.

MEETING CLOSED at 8.40pm and after a coffee break a demonstration of WICEN procedures was held.

#####

NEXT BARG MEETING Friday 26th May at Education Centre. 7.30pm.

#####

30 m QRP

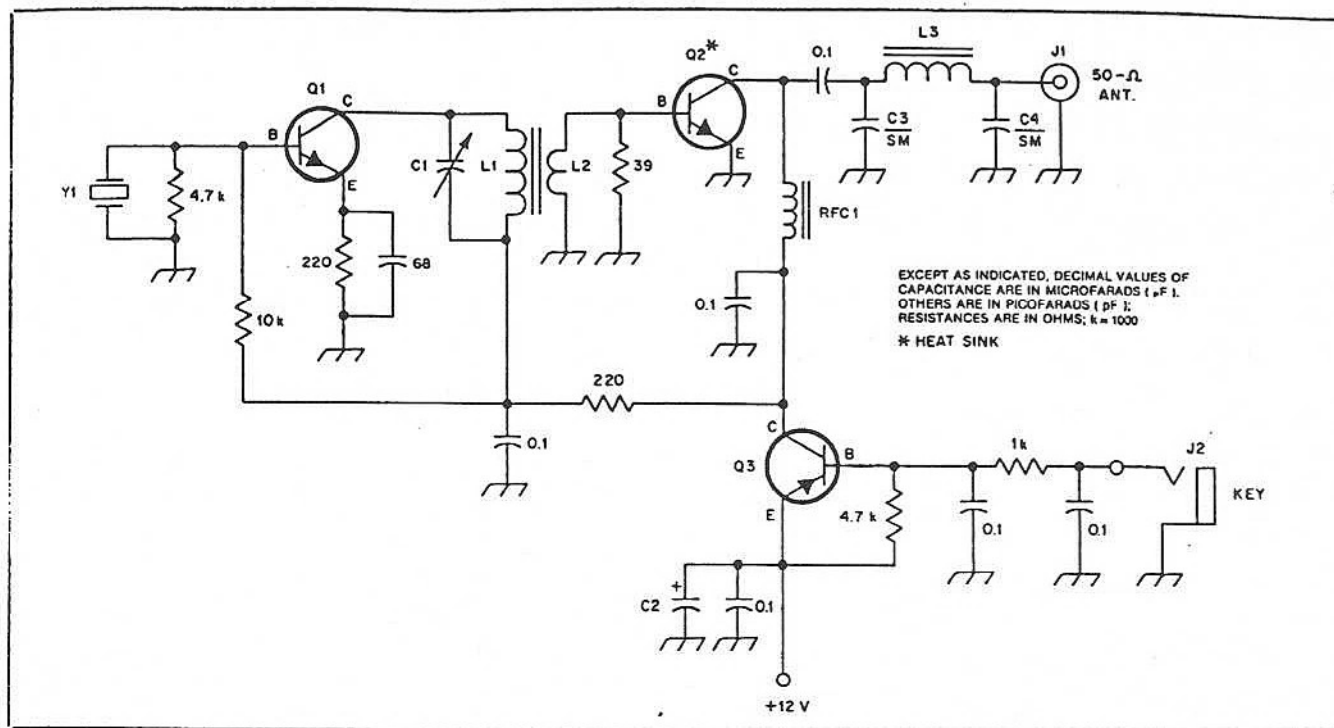


Fig 1—A schematic diagram of the QRP transmitter for 30-meter operation. Fixed-value capacitors are disc ceramic. Inductor cores are available from Amidon Associates or Palomar Engineers.^{1,2} The enclosure is from Radio Shack® (RS 270-251), and the circuit board is from Circuit Board Specialists.³

Y₁—Fundamental-mode crystal for the 30-meter band.

Q1—2N2222A or equiv.

Q2—2N3553 or equiv.

Q3—2N4036 or equiv.

C1—150-pF mica trimmer, ARCO no. 424.

C2—470- μ F, 25-V electrolytic or tantalum capacitor.

C3, C4—330-pF silver-mica or polystyrene capacitor.

L1—30 turns, AWG no. 24 enameled wire on a T-50-2 core.

L2—3 turns, AWG no. 24 enameled wire over L1.

L3—13 turns, AWG no. 22 enameled wire on a T-50-2 core.

RFC1—30 turns, AWG no. 28 enameled wire on an FT-37-63 core.

J1—SO-239.

J2—Phone jack or phono jack.



LAKE BOLAC ?

by Tom Ivall

Radar in retrospect

Report on IEE seminar marking fifty years of radar development

"The myth that we entered the war as the sole possessor of radar has of course long since been exploded. The Germans had been developing radar since 1934 and entered the war with the Freya early warning system on 2.5 metres, a wide deployment of Wurzburgs on 50 centimetres, a naval radar on 80 centimetres, and an airborne radar on 60 centimetres. Until our development of centimetric radars the German systems were superior to ours."

This was Sir Robert Cockburn, a former director of the Royal Aircraft Establishment, on Britain's radar in the 1939-45 world war. He was presenting a paper at the IEE's celebratory seminar on fifty years of Radio Detection and Ranging, "The history of radar development to 1945", held in London, 10-12 June.

It was not only Sir Robert's comments that made it abundantly clear, to anyone in doubt, that other countries besides the UK made important contributions to the development of radar. Papers given by American, Dutch, German, Italian, Japanese and Swiss authors, with accounts by British authors of French and Russian work, gave a

pretty full picture of what was essentially an international achievement.

Paradoxically, though, a large part of this combined achievement wasn't co-operative but competitive — under the fierce stimulus of war. The UK's leading work in airborne microwave radar, for example, only became available to Germany and its allies when British aircraft were shot down and their radar sets were salvaged and studied.

The notion put about some decades ago that Britain "invented" radar would certainly not have been swallowed by anyone with even a general knowledge of radio science and engineering, let alone the radar specialists.

The basic principle — reflection of electromagnetic waves from objects — had been known to the whole scientific world for over half a century. After all, as early as 1865 Clerk Maxwell had recorded his belief that light was an electromagnetic-wave phenomenon — implying the possibility of reflection — and Hertz had rapidly shown that reflection was indeed a reality soon after he had demonstrated the existence of

e-m waves in 1888.

From then on, physicists and experimenters in several countries observed the phenomenon of radio wave echos, and a few speculated on possible uses of this effect. The chronological table in this report, starting from a hundred years ago, lists some of the early discoveries, experiments and proposals that led to the development of radar as a mature technology. In general it is a story of gradual progression from metre-waves to centimetre-waves, as magnetrons became more stable and powerful, and of widening application from ground stations to ship and aircraft installations. Dates are largely drawn from the IEE's seminar but should not be taken as necessarily exhaustive, authoritative or completely representative.

The table does show, however, at least half a dozen industrialized nations contributing to radar in various ways. Mr S. Swords of Trinity College, Dublin, in an excellent survey of the beginnings of radar, listed the following nine countries as having provided significant technological effort: (in alphabetical order) America, Britain, France, Germany, Hol-

land, Hungary, Italy, Japan and Russia.

Forgetting the crude, jingoistic propaganda of the past, there is no question, though, that Britain played a very important part in the whole story, particularly under the pressure of war. To judge from the seminar, the UK appears to have made two major contributions. One was the rapid and highly effective development, production and deployment of centimetric airborne radar, following the invention of the resonant cavity magnetron by Randall and Boot at Birmingham University in 1939. The other was the early warning chain of 19 ground metre-wave radar stations built round the coast of Britain — the so-called CH (Chain Home) stations — from Orkney to the Isle of Wight. This chain was built secretly at a cost of about £10M (now roughly equivalent to £200M), was totally integrated with the RAF's system of fighter aircraft control, and was fully operational to meet the onslaught of enemy bombers by the start of the 1939-45 war.

When the Tizard Commission went to the USA in 1940 — to exchange Britain's military tech-

Chronology of early R&D leading to radar

1885	Edison (USA) patents system for collision avoidance at sea.				
1888	Hertz (Germany) observes reflection of e-m waves.				
1900	Tesla (Serbia) suggests radio detection of icebergs.				
1904	Hulsmeyer (Germany) patents and demonstrates spark-transmitter apparatus for detecting presence of ships — the Telemobiloscope.				
1916	Marconi (Italy) and Franklin (UK) note reflection of 2-m waves from metal objects.				
1921	Hull (USA) publishes description of early form of magnetron.				
1922	Marconi suggests use of s.w. reflections to detect and find bearing of ships. Taylor and Young (USA) observe 60-MHz reflections from river steamer.				
1925	Appleton and Barnett (UK)				
	discover new layer in ionosphere (F) by h.f. echo sounding.				
1927	Okabe (Japan) invents split-anode Magnetron.				
1928	David (France) suggests use of h.f. beam for detecting aircraft.				
1930	Hyland (USA) observes 60 MHz reflections from aircraft. Franklin (UK) proposes use of centimetre waves to obtain "wireless pictures".				
1931	Butement and Pollard (UK) demonstrate reflection of pulsed 50-cm waves from objects at about 100m range, using rotating beam.				
1933	Philips company (Netherlands) produces 1-GHz split-anode magnetrons. Korovin (USSR) starts research on radio detection of aircraft.				
1934	David (France) tests 75-MHz c.w. detection of aircraft. Kuhnold (Germany) demonstrates 630-MHz echos from a battleship. USSR tests c.w. 64-MHz early warning radar with range of over 70 km. Netherlands armed forces group observes reflections at 240 MHz.				
1935	Tiberio (Italy) formulates theoretically the "radar equation". Germany installs 100-MHz radar on ships. Watson-Watt (UK) presents memorandum "Detection and location of aircraft by radio methods" to government. Wilkins (UK) tests c.w. air-				
	craft detection using BBC's Daventry h.f. station. Gutton (France) installs 16-cm scanning radar on <i>Normandie</i> liner.				
1936	Okabe (Japan) demonstrates c.w. Doppler radar. Vallauri (Italy) starts research group on "radio detector telemetro". Page (USA) produces 80-MHz pulse radar for aircraft detection.				
1937	Gutton (France) develops split-anode magnetron of 10W mean power at 16cm.				
1939	Randall and Boot (UK) construct resonant cavity magnetron.				
1940	USA establishes civilian Radiation Laboratory to develop military microwave radar.				
1943	USSR establishes permanent military Council for Radar.				

nology secrets for production capacity — the US Army and Navy were so impressed by these two achievements that action followed immediately. According to Dr E.G. Bowen, who related his part in this exchange, urgent steps were taken to put US radar systems into operational use, and orders for the manufacture of both US systems and copies of British radar systems went out to industry. "It persuaded the top [American] brass that radar was a tool of prime operational importance in modern warfare," commented Dr Bowen.

All this can be seen to have started from Watson-Watt's authoritative and now famous memorandum to the UK government in 1935, "Detection and location of aircraft by radio methods." It was certainly this document which provided the IEE with an arbitrary — though justifiable — date for celebrating fifty years of radar development in 1985. And Dr C. Susskind of the University of California, in his provocatively-titled paper "Who invented radar?", seemed to support the choice. After saying somewhat mellifluously that the development of radar followed upon "the confluence of several prerequisites brought to maturation in the 1930s" he expressed the view that Watson-Watt's memorandum stood out as the most influential of all radar publications because it was "the first to lead to the development of a system for gathering and collating radar data and acting upon them."

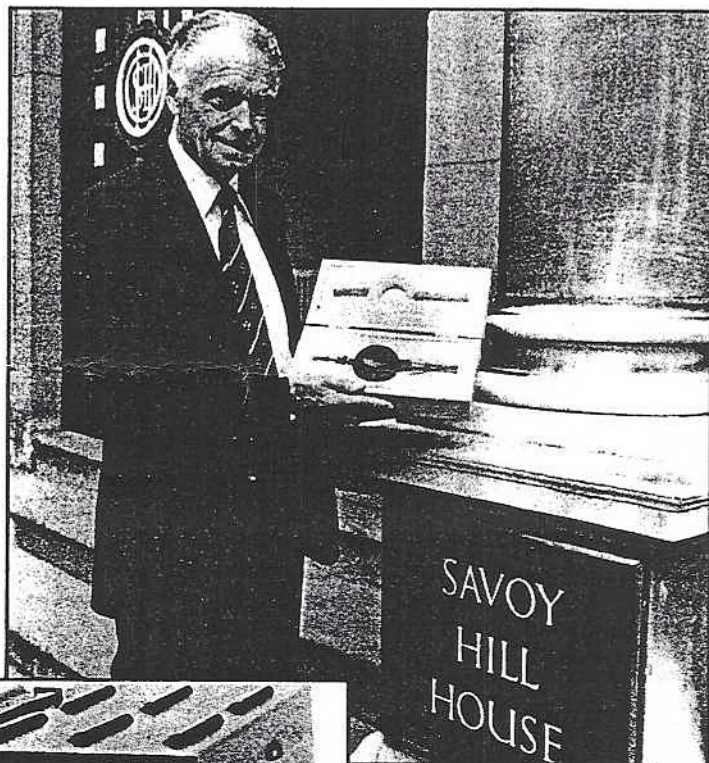
The other maritime nations that are often compared with Britain in terms of geographical area and population are Italy and Japan. As can be seen from the table, both of these countries contributed to radar development, though somewhat late in the course of events.

Italy's involvement, according to a paper by Captain R. Palandri and Professor M. Calamia, dated from 1933. In that year Guglielmo Marconi — while handing over a microwave link between Rome and Castelgandolfo — impressed the significance of radar on the Italian military authorities. (He had been, after all, a member of the Fascist party since 1923.) Then in 1935 Marconi gave demonstrations of reflection phenomena and this resulted in a report being sent to the Italian minister of defence by Professor U. Tiberio.

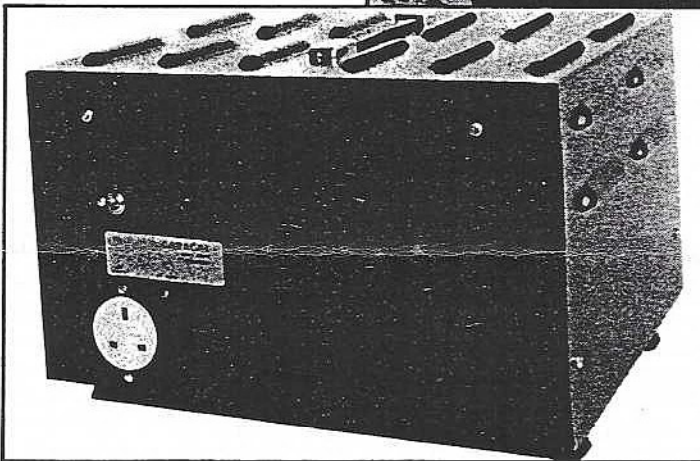
Soon afterwards a research

group was formed at the Royal Institute for Electrotechnics and Communications. Professor Tiberio joined this group in 1936 and devised experiments to test the validity of the "radar equation" he had formulated. From 1936 to 1943 various radar systems were developed, including a frequency modulated c.w. equipment working on 200 MHz and a 70-cm pulse radar with a double horn antenna, newly developed transmitter triodes and 'acorn' receiver triodes. Manufacture of radar sets started in 1941 but met with difficulties due to the war and was finally halted when hostilities moved onto Italian territory in 1943.

Japan's contribution to radar was outlined by Dr S. Nakajima of the Japan Radio Company and by Mr Sword's survey. Dr Nakajima spoke of microwave research



Dr E.G. Bowen with the cavity magnetron he took to the USA as part of the Tizard Commission in 1940. The raised cylinder in the middle indicates the periphery of the resonator system; this is surrounded by circular cooling fins. On the left are the cathode and heater leads (the oxide-coated cathode being connected to one side of the heater). On the right is the output side arm.



work by his company and the Japanese Navy's Technical Research Institute from 1932 onwards, but said nobody had practical applications in mind at that time. Research on magnetrons started in 1933, including experiments with 18 different types of anodes. Continuous power outputs of 500W were obtained from water-cooled magnetrons and wavelengths of 0.7, 2, 3, 10 and 15cm were generated.

Dr Nakajima said that in 1953 he had visited the London Science Museum and examined the Birmingham University resonant cavity magnetron on view there. He could not see any difference between it and the Japanese-developed magnetrons of the late 1930s.

In 1936 Professor Okabe, possibly influenced by Professor Yagi (of dipole fame), demonstrated detection of aircraft by a c.w. Doppler system. The following year, experiments in conjunction with the Japanese Navy

achieved detection ranges of up to 5 km in Tokyo Bay. For defence of the Japanese mainland against air attack the Navy set up c.w. radar stations on ships and land operating on 1.5m, 2m and 6m. The 6m sets could detect aircraft in formation at a range of 450 km and single aircraft at 250km. Mobile ground radar for aircraft detection went into production.

Airborne radar development did not start seriously until 1942, after a captured British airborne pulse radar had been sent to Japan from Germany in 1941. But v.h.f. aircraft radar sets were produced, working on wavelengths around 2 metres. A copy of the German Würzburg gun-laying radar was put into production in 1943 but never went into service.

In general, commented Dr Nakajima, Japan was not very prominent in radar development before 1945 because the country's research capability was in no

way comparable with those of the USA and UK: for example, only A-type displays were used. He complained that he had had an R & D of 800 people working on radar and magnetrons at the time Japan entered the war, but this was cut down to a half in the ensuing years. Japanese scientists and engineers were not fully utilized in the Army and Navy Research programmes.

Most of the people attending the IEE seminar appeared to be sexa-, septua- or octo-genarians. Indeed one very lively account of radar development at the Lorenz company came from the nonagenarian Dr G. Muller — but only his recorded voice, as he had preferred to remain at home in Berlin for his 90th birthday party. Hardly anyone present seemed to be under the age of fifty.

It was a pity the young apparently showed no interest in what was undoubtedly an exciting and adventurous period of electronics history.

PACKET RADIO

At the Club meeting on the 28th April, packet radio and associated equipment was discussed. During this discussion, and afterwards, questions were raised as 'what is it?', 'what is he talking about?', and comments like 'I don't understand it', or 'I have not become involved because it is so strange'. My main reason for this little screed is to try and convey some answers and understanding (maybe), without any complicated technical talk.

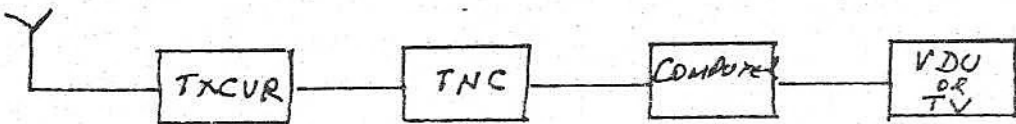
WHAT IS PACKET? Packet uses ASCII code which is sent in groups of up to 255 units/characters. The packets are transmitted entirely automatically, and error free, with economy of use of the radio spectrum.

Packet radio is not strange or difficult, but I must confess it does take a little time and study to set-up the operating system to begin. Once this set-up is completed, it does not require setting up each switch-on. Some time must also be taken to learn the on-screen layout and information. Next, some typing ability is required, and that only takes practice and more practice. QSOs are conducted the same as with voice or CW, except that in packet, the machines do all the calling, entering callsigns, repeats if necessary - all you have to do is type the words you want the other station to read - no signal report exchanges either. When you are 'connected', everything you send, and vice-versa, will be received error free.

The equipment required:-

1. a transceiver; any 2m or HF off-the-shelf rig (2m hand-helds require a little extra connecting),
 2. a TNC (Terminal Node Controller). This is a little black box that, as the name suggests, controls the transmission and reception of the packets of information. These black boxes can range in price from around \$100 to \$700, and in a variety of sizes and versatility. Kits, and 'make you own' are another choice.
 3. a computer. I would dare to say that the greatest number in use with packet radio would be the Commodore C64. Others are C128, onto IBM types. There are programs now coming on stream for the Microbee and VZ200. Programs for the C64 come on either disk, or a plug-in cartridge. Second-hand C64 bargains are available. Of course, some of the pricey TNCs have the computer side built into them, so no extras to buy.
- and that is it.

A block diagram would appear like this:-



Used on either 2m, 6m, or HF.

Operates at 1200 bauds on VHF, and some amateurs are now experimenting using baud rates up to 9000. On HF however, the baud rate is set slower to overcome QRM, QRN, and QSB.

Packet lengths (what you send) can contain up to 255 characters on VHF, the usual is set at 80; and, again, on HF lengths are shorter. Packet lengths are easily changed on the computer programs (some TNCs may need adjusting).

89/05 08

Bulleting Boards, or BBS, ('Mailboxes') are another mystery topic that packeteers use. Bulletin boards are merely packet stations set up by either individuals or clubs to be a centre where messages may be left for another station, or relayed on (via other BBS) to any packet station world-wide. Banks of general information messages are also stored. Messages may be personal/private and/or designated for anyone, or everyone. Of course a BBS station would have to have a much larger computer with heaps of storage capacity.

Being error free, packet radio can also be used for sending or receiving computer programs or files.

"Who is AAPRA?", or "What is AAPRA?" were other questions raised. A.A.P.R.A. is the Australian Amateur Packet Radio Association, formed in Sydney in 1985. It has members in many countries, and exists to promote and encourage the use of packet radio for amateur radio operators. Services offered by this group include newsletters, supply of software and kits, help with computer terminal software, information on the supply of TNCs, BBS in Sydney and Melbourne, and a voice in the W.I.A.. AAPRA has supplied clubs with equipment to set up digipeaters in many areas of N.S.W., Queensland, and Tasmania. Hopefully Ballarat will be next; to complete the Eastern State network to South Australia.

If I can be of any further help, or you would like to see packet in operation, please give me a call, either by phone, or sometimes on Channel 3.

73s

Clarry VK3DMK.

P.S. A letter, dated May 5, 1989, from AAPRA has been received which states in part that the application for a Digipeater was approved in principle, on the following basis:-

AAPRA will sell the equipment to the club for \$1.

AAPRA reserves the right to repurchase the equipment for the full price of \$1.

AAPRA reserves the right to rereplace and/or upgrade the equipment at AAPRA'S cost as needed by changing technology;

and that the club has no right to dispose of the equipment, and the club is responsible for arranging Public Liability insurance, and the club is required to carry out maintenance - with assistance from AAPRA if needed.

C.K.

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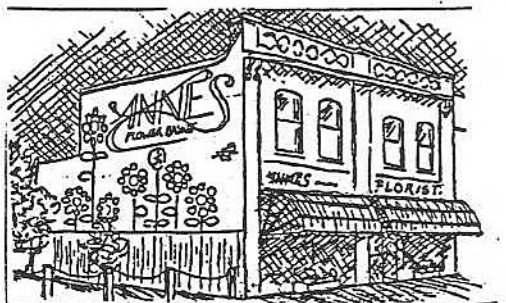
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